

What is claimed is:

1. A method of building a display device, the method comprising:
providing a liquid crystal panel including liquid crystal molecules contained
between glass substrates, wherein long axes of the liquid crystal molecules are oriented
orthogonal to the glass substrates in absence of electrical field;
coupling a set of compensation films to at least one of the glass substrates,
wherein the set of compensation films includes one or more uniaxial compensation
films and provides a total retardation value less than or equal to 200 nm for light having
a wavelength of about 550 nm;
coupling a polarization film to the set of compensation films; and
coupling electrodes to the liquid crystal panel.
2. The method of Claim 1 further comprising making the total
retardation value less than or equal to 160 nm for light having a wavelength of about
550 nm if the display device is a transmissive type.
3. A method of improving the viewing angle of a vertically-aligned liquid
crystal display device, the method comprising:
providing liquid crystal molecules positioned between a first glass substrate and
a second glass substrate; and
coupling a uniaxial compensation film of a predetermined thickness to at least
one of the glass substrates such that the uniaxial compensation film provides a
retardation value of 200 nm or less for light having a wavelength of about 550 nm.
4. The method of Claim 3 further comprising setting a maximum
predetermined thickness to about 50 microns.
5. The method of Claim 3 further comprising selecting the uniaxial
compensation film based on thickness.
6. The method of Claim 3, wherein the uniaxial compensation film is a
single film having a thickness of about 15-25 microns and a retardation value of about
75-85 nm, and providing a viewing angle of at least 70 degrees from the top and the
sides.

7. The method of Claim 3 further comprising:
dividing the uniaxial compensation film into a first layer and a second layer so
that a combined thickness of the first and the second layers are substantially equal to the
predetermined thickness;

5 disposing the first layer so that it is closer to the first glass substrate than to the
second glass substrate; and

disposing the second layer so that it is closer to the second glass substrate than
to the first glass substrate.

10 8. A method of designing a compensation film for a liquid crystal display
device, the method comprising:

determining a position(s) of the compensation film(s); and
making a total retardation value for the compensation film(s) positioned along a
light path less than 200 nm for a light having a wavelength of 550 nm.

9. A method of designing a compensation film for a liquid crystal display
device, the method comprising:

20 determining a position(s) of the compensation film(s); and
making a combined thickness of the compensation film(s) positioned along a
light path less than 50 microns.

10. A display device comprising:
a liquid crystal layer disposed between glass substrates so that long axes of
liquid crystal molecules are oriented orthogonal to the glass substrates;

25 a set of compensation films coupled to at least one of the glass substrates,
wherein the set of compensation films are selected based on having a total retardation
value less than or equal to 200 nm for light having a wavelength of about 550 nm;

30 a polarization film coupled to the set of compensation films; and
a first electrode and a second electrode coupled to the glass substrates.

11. The display device of Claim 10, wherein the glass substrates comprise:
a TFT panel that includes an array of thin film transistors; and
a color filter array panel.

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12. The display device of Claim 11, wherein the color filter array panel comprises:

a substrate;
a plurality of black matrices formed on the substrate;
5 color filters formed on the black matrices; and
a common electrode formed on the color filters.

13. The display device of Claim 11, wherein the TFT panel comprises:

a substrate;
10 gate wires formed on the substrate;
an insulating layer formed on the gate wires;
silicon stripes formed on the insulating layer;
ohmic contacts formed on the silicon stripes;
data wire formed on the ohmic contacts and intersecting some of the gate wires;
15 a passivation layer formed on top of the data wire; and
pixel electrodes formed on the passivation layer and selectively making contact
with some of the data wire.

14. The display device of Claim 13, wherein the passivation layer has an
20 uneven surface with protrusions and depressions.

15. The display device of Claim 13, wherein the pixel electrodes are made
of a reflective material.

25 16. The display device of Claim 10, wherein the polarization film is a first
polarization film having a first polarization axis, further comprising a second
polarization film coupled to the liquid crystal layer and having a second polarization
axis that is oriented substantially perpendicular to the first polarization axis.

30 17. The display device of Claim 10, wherein the set of compensation films
are selected based on having a total thickness equal to or less than 50 microns.

18. The display device of Claim 10 further comprising a protective film coupled to the polarization film to protect the polarization film, the protective film including triacetate cellulose.

5 19. The display device of Claim 10, wherein the set of compensation films have negativity and generates retardation.

10 20. The display device of Claim 10 further comprising a reverse dispersion phase difference film located between one film of the set of compensation films and the polarization film.

21. The display device of Claim 10, wherein the glass substrates are separated by approximately 2.5 – 3.5 microns.

15 22. The display device of Claim 10 having a viewing angle larger than 75 degrees from the top and larger than 74 degrees from the sides at a contrast ratio of 2:1.

20 23. The display device of Claim 10, wherein the display device has one of a reflective-type and a transmissive-type configuration, wherein compensation films positioned along a light path have a collective retardation value of 160 nm for light of 550 nm wavelength.